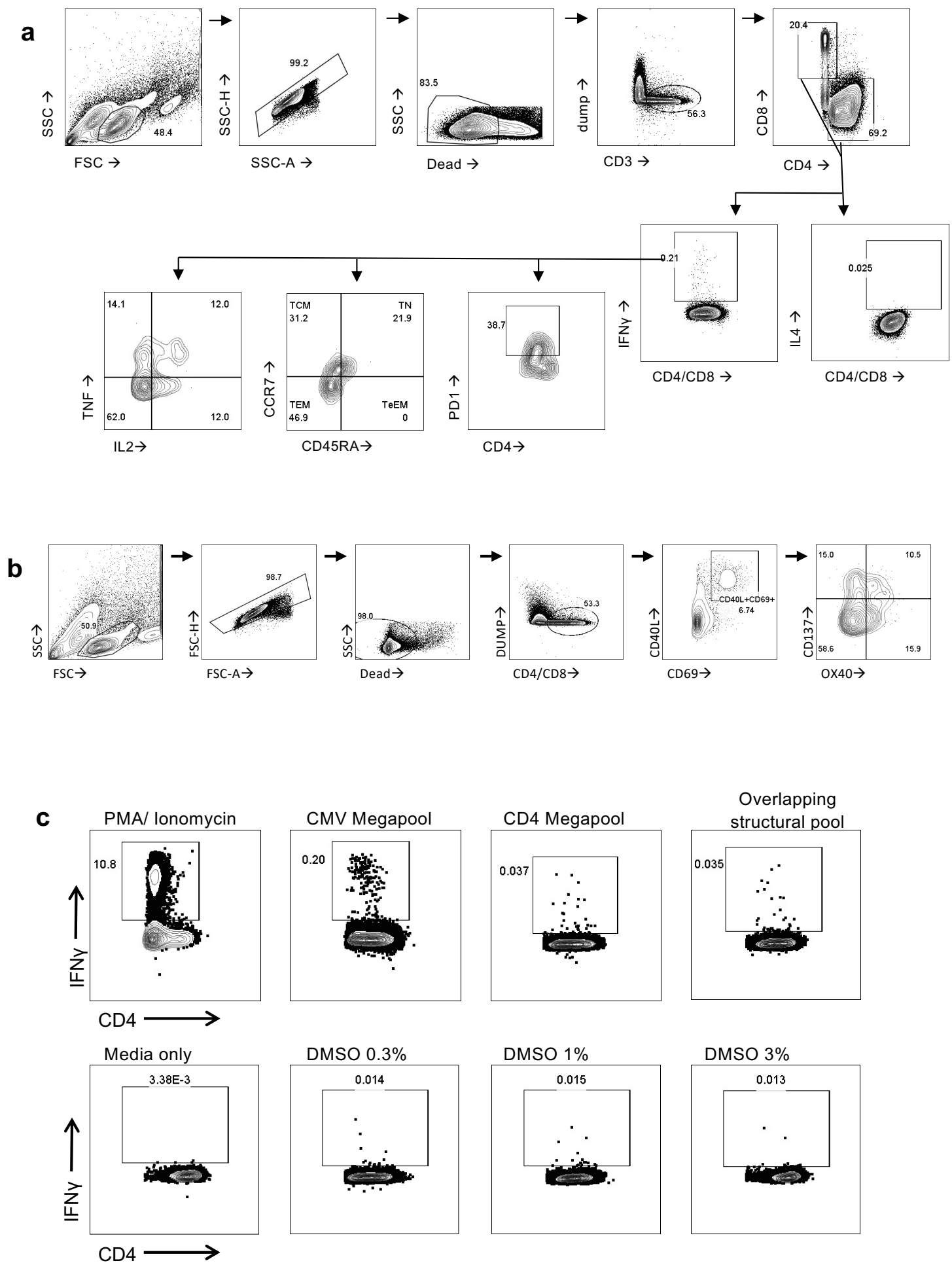


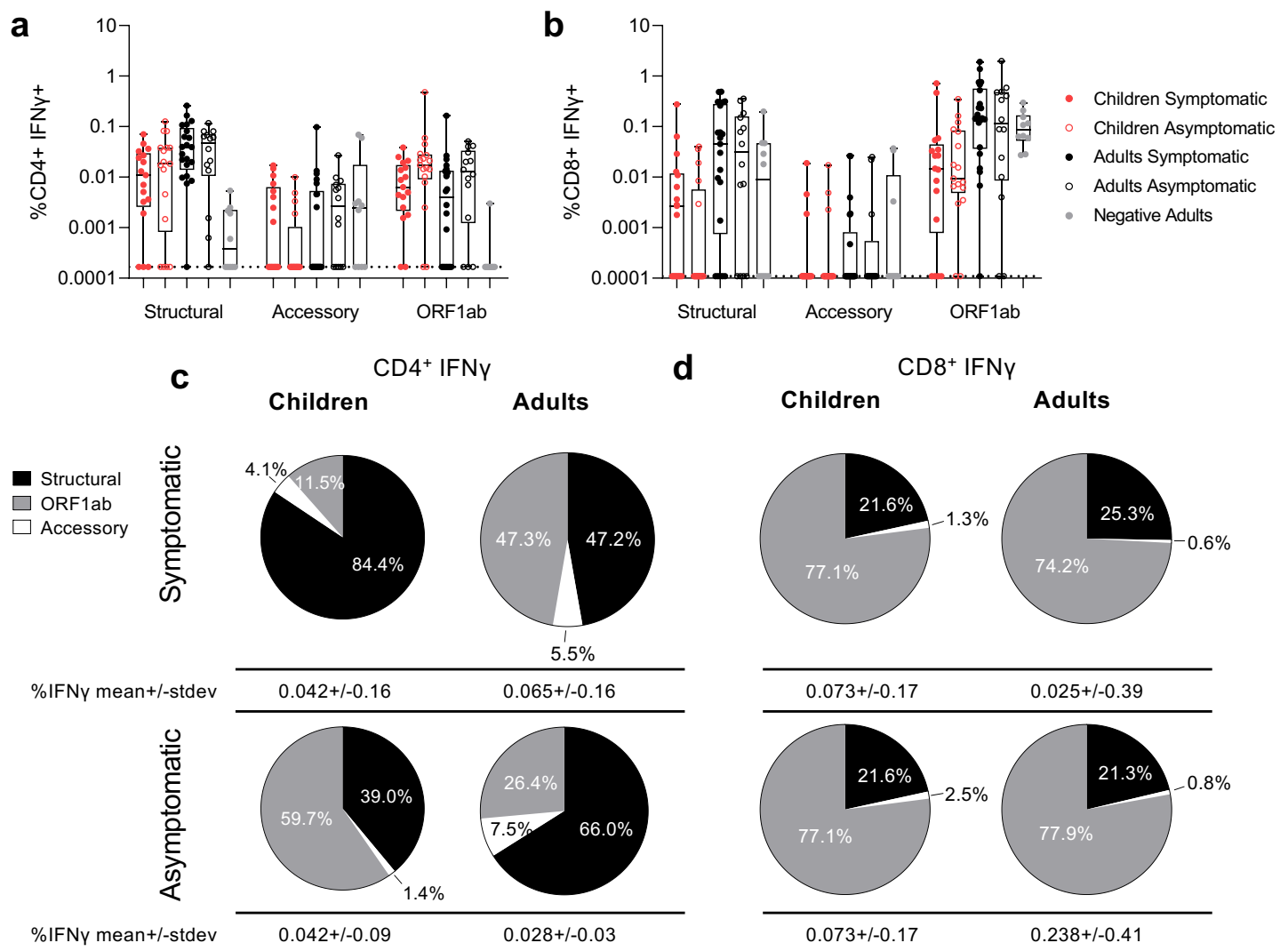
Supplementary Table 1. T cell response in COVID-19 patients, trend and versus controls

T cells		Trend days after symptom onset		Children vs Adults		COVID-19 cases vs Controls		
		Estimate	P-value	Estimate	P-value	Median (case)	Median (negative)	P-value
CD4	Structural IFN γ ⁺ (total)	0.000012	0.920	-0.029	0.01	0.0479	0.00999	0.003
	ORF1ab IFN γ ⁺ (total)	0.00016	0.310	0.017	0.297	0.0235	0.0115	0.004
	Accessory IFN γ ⁺ (total)	-0.000037	0.256	-0.0043	0.153	0.0124	0.0134	0.350
	Structural TEM	0.0032	0.950	-3.2	0.493	88.7	89.5	0.552
	Structural TCM	-0.017	0.577	1.5	0.625	9.28	8.54	0.752
	Structural IFN γ ⁺ TNF ⁺	-0.0000095	0.637	-6.00E-04	0.756	0.00436	0.000813	0.051
	Structural IFN γ ⁺ TNF ⁺ IL2 ⁺	-0.000086	0.003	-0.0077	0.232	0.00342	0.000723	0.068
CD8	Structural IFN γ ⁺ (total)	0.00014	0.592	-0.094	0.009	0.0345	0.0395	0.884
	ORF1ab IFN γ ⁺ (total)	0.00052	0.596	-0.27	0.008	0.101	0.101	0.818
	Accessory IFN γ ⁺ (total)	-0.000029	0.084	-0.0021	0.184	0.00796	0.0157	0.156
	Structural TEM	-0.045	0.452	7.7	0.232	77.4	68.5	0.350
	Structural TCM	0.10	0.006	-2.1	0.546	10.6	20.6	0.022
	Structural IFN γ ⁺ TNF ⁺	0.0000050	0.678	-0.0015	0.219	0.000595	0	0.036
	Structural IFN γ ⁺ TNF ⁺ IL2 ⁺	0.00000031	0.845	-0.00041	0.276	0	0	0.315

* P value by Mann-Whitney test, significant values in red

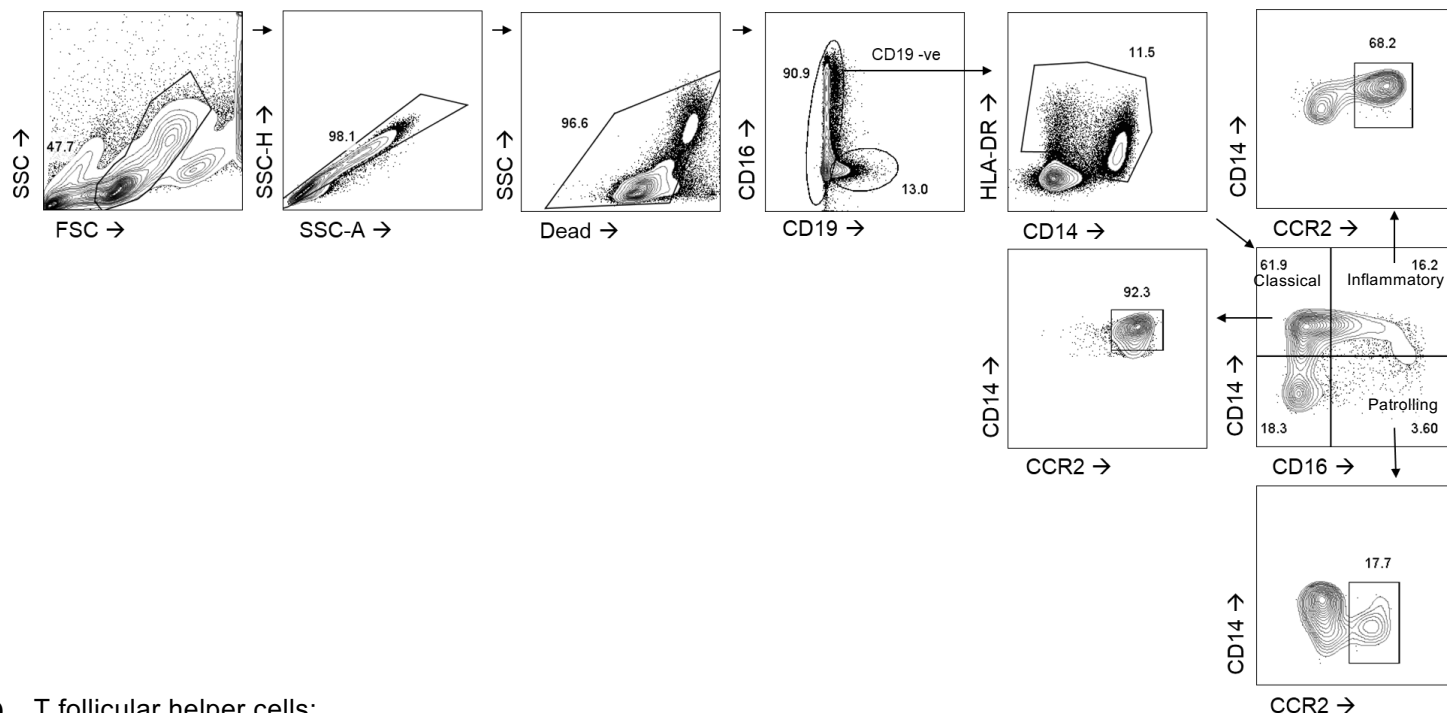


Supplementary Figure 1 – SARS-CoV-2 specific cells for cytokine production and phenotype by Flow cytometry. (a) The gating strategy for the characterisation of IFN γ and IL4 responses for CD4 $^{+}$ and CD8 $^{+}$ T cells for cytokine production (IL4, IFN γ , TNF, IL2), memory phenotype (CCR7, CD45RA), and exhaustion markers (PD1). (b) Gating strategy for detection of activation induced markers (CD40L, CD69, CD137 and OX40) on CD4 $^{+}$ and CD8 $^{+}$ T cells. (c) FACS plots showing CD4 $^{+}$ IFN γ production to positive controls, PMA/Ionomycin, a CMV megapool and a CD4 specific megapool (from Grifoni *et al.* 2020), and negative controls with a range of DMSO concentrations.

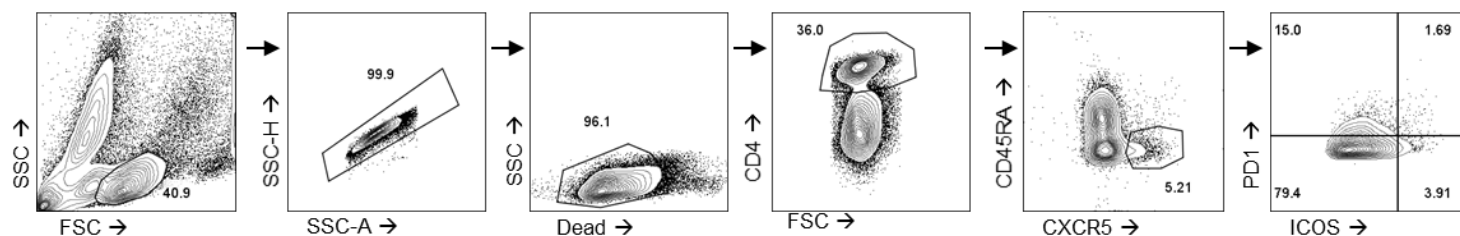


Supplementary Figure 2 - IFN γ CD4⁺ and CD8⁺ T cell responses are not different between symptomatic or asymptomatic SARS-CoV-2 infected children or adults. The SARS-CoV-2 CD4⁺ (a) or CD8⁺ (b) T cell responses of COVID-19 symptomatic children (n= 17, mean \pm stdev: 38.8 \pm 40.6 days), asymptomatic children (n= 17, 26.2 \pm 39.3 days), symptomatic adults (n= 22, 60.3 \pm 55.5 days), asymptomatic adults (n= 14, 32.8 \pm 32.3 days), from acute, convalescent and long-term memory time points (day 1 to 180 post symptom onset) and negative controls (n=10). Data represents the individual response with background subtracted, box and whisker plots median with upper and lower quartiles, minimum and maximum values. Multiple comparisons were performed using Kruskal-Wallis test for between-group comparison. Pie charts of total IFN γ ⁺ CD4⁺ (c) and CD8⁺ (d) T cell SARS-CoV-2 responses with background subtracted and non-responders assigned a response of zero (from a, b).

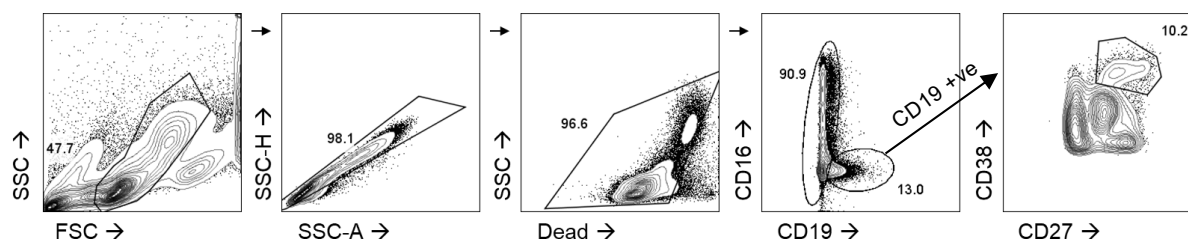
a Monocytes:



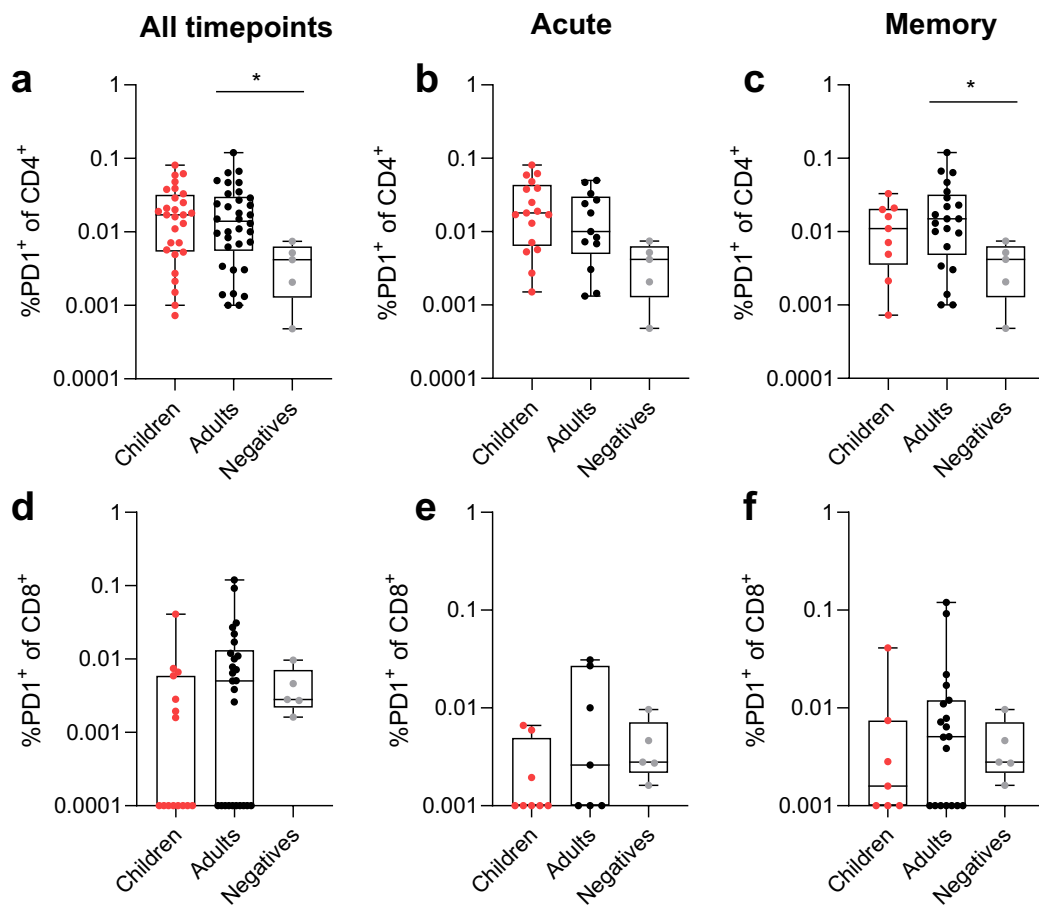
b T follicular helper cells:



c Plasmablasts:



Supplementary Figure 3 – Cellular recruitment during acute infection of children shows increased Tfh responses. (a) The gating strategy for characterisation of total, classical, inflammatory and patrolling monocytes and their activation levels (by CCR2). Gating strategy for activated T follicular helper cells (b) and total plasmablasts (c).



Supplementary Figure 4 – T cell exhaustion is equivalent in adult and children CD4 and CD8 T cells. PD1⁺ IFN γ ⁺ CD4⁺ (a-c) and CD8⁺ (d-f) T cells in response to stimulation with structural pool at all time points (a, d) (day 1-180) in children (red), adults (black) and negative adults (grey) who are responders. Data separated into acute (b, e) (day <14 post symptom onset) and convalescent/memory (c, f) (day 15-180 post infection) time points. (a-f) Data is presented as individual data points with box and whiskers showing median, upper and lower quartiles and minimum and maximum values. Comparisons between infected children and adults, or infected adults and negative adults are carried out using Mann-Whitney (unpaired) test where * $p < 0.05$, (a) * $p = 0.0298$ (c) * $p = 0.0393$.